

AMENDMENTSIn the Claims:

Please amend claims 1, 3-9, 12, 14-15, 17-24, 26, 28-36 and cancel claims 2 and 16.

1. (Currently Amended) An electrophoresis apparatus for processing compounds in small sample volumess ~~by electrophoretic separation, the apparatus comprising:~~

- (a) a cathode in a static cathode buffer zone or compartment;
- (b) an anode in a static anode buffer zone or compartment, the cathode disposed relative to the anode so as to be adapted to generate an electric field in an electric field area therebetween upon application of a voltage potential between the cathode and anode;
- (c) a first non-isoelectric separation barrier disposed in the electric field area;
- (d) a second non-isoelectric separation barrier disposed between a selected one of the cathode buffer zone and the anode buffer zone and the first barrier so as to define a first chamber ~~having an~~ interstitial volume of less than 5 mL ~~or chamber~~ therebetween;

wherein in use, electrophoretic buffer is disposed in the cathode buffer zone and the anode buffer zone, a sample ~~constituent~~ containing one or more compounds is provided to the first ~~interstitial volume~~ chamber; wherein upon application of the voltage potential, a selected ~~separation product~~ compound is removed from the sample ~~constituent~~ through a ~~selected one of~~ the first ~~and or second~~ non-isoelectric separation barriers, and provided to a ~~selected one of~~ the cathode buffer zone or and the anode buffer zones; and wherein there is substantially no circulation of buffer or sample ~~constituent~~ in the buffer zones or the first ~~interstitial volume~~ chamber.

2. (Cancel) ~~The apparatus according to claim 1 wherein the small volume is less than about 5 mL.~~

3. (Currently Amended) The apparatus according to claim 2 1 wherein the interstitial ~~small~~ volume is less than or equal to about 2 mL.

4. (Currently Amended) The apparatus according to claim 3 wherein the interstitial ~~small~~ volume is from about 0.02 mL to about 0.1 mL.

5. (Currently Amended) The apparatus according to claim 1 wherein a ratio of interstitial ~~sample~~ volume to barrier surface area in the chamber is less than about 1 mL/cm².

6. (Currently Amended) The apparatus according to claim 1 wherein the ratio of interstitial volume to barrier surface area in the chamber is less than or equal to about 0.5 mL/cm².
7. (Currently Amended) The apparatus according to claim 1 wherein the ratio of interstitial volume to barrier surface area in the chamber is less than or equal to about 0.1 mL/cm².
8. (Currently Amended) The apparatus according to claim 1 wherein the ratio of interstitial volume to barrier surface area in the chamber is about 0.02 mL/cm².
9. (Currently Amended) The apparatus according to claim 1 wherein the first and second barriers are non-isoelectric membranes ~~and wherein such membranes are selected from the group consisting of electrophoresis separation membranes having a defined pore size or restriction membranes which allow flow of ions into and out of a chamber or compartment under the influence of an electric field but do not allow movement of macromolecules, or a combination thereof.~~
10. The apparatus according to claim 9 wherein at least one of the first and second membranes is an ion-permeable electrophoresis separation membrane comprised of polyacrylamide and having a molecule mass cut-off from about 1 kDa to about 1500 kDa.
11. The apparatus according to claim 10 wherein a selected one of the first and second membranes is an ion-permeable electrophoresis separation membrane comprised of polyacrylamide and having a molecule mass cut-off from about 1 kDa to about 1500 kDa and the other membrane is a restriction membrane comprised of polyacrylamide and having a molecular mass cut-off less than the separation membrane.
12. (Currently Amended) The apparatus according to claim 1 wherein the first and second separation barriers are non-isoelectric membranes ~~and such membranes are comprised of materials selected from the group consisting of ultrafiltration materials, electro dialysis materials, haemodialysis materials, and combinations thereof.~~
13. The apparatus according to claim 1 wherein the first and second separation barriers are adapted to be removed from the apparatus.
14. (Currently Amended) The apparatus according to claim 1 comprising a plurality of separation membranes space apart defining a plurality of chambers having an interstitial volume of less than 5 mL.
15. (Currently Amended) An electrophoresis apparatus for processing compounds in small sample volumess ~~by electrophoretic separation, the apparatus comprising:~~

- (a) a cathode in a static cathode buffer zone or compartment;
- (b) an anode in a static anode buffer zone or compartment, the cathode disposed relative to the anode so as to be adapted to generate an electric field in an electric field area therebetween upon application of a voltage potential between the cathode and anode;
- (c) a first non-isoelectric separation barrier disposed in the electric field area;
- (d) a second non-isoelectric separation barrier disposed between the cathode buffer zone and the first barrier so as to define a first chamber having an interstitial volume of less than 5 mL or chamber therebetween;
- (e) a third separation barrier disposed between the anode buffer zone and the first barrier so as to define a second interstitial volume or chamber having a interstitial volume of less than 5 mL therebetween;

wherein in use, electrophoretic buffer is disposed in the cathode buffer zone, the anode buffer zone and at least one of the first interstitial and second interstitial volumes chambers, a sample constituent containing one or more compounds is provided to a selected one of the first interstitial and second interstitial volumes chambers; wherein upon application of the voltage potential, a selected separation product compound is removed from the sample constituent, through the first separation barrier, and provided to the other of the first interstitial and second interstitial volumes chambers; and wherein there is substantially no circulation of buffer or sample constituent in the buffer zones, the first interstitial volume chamber or the second interstitial volume chamber.

- 16. (Cancel) The apparatus according to claim 15 wherein the small volume is less than about 5 mL.
- 17. (Currently Amended) The apparatus according to claim 15 wherein the interstitial small volume is less than or equal to about 2 mL.
- 18. (Currently Amended) The apparatus according to claim 17 wherein the interstitial small volume is from about 0.02 mL to about 0.1 mL.
- 19. (Currently Amended) The apparatus according claim 15 wherein a ratio of interstitial sample volume to barrier surface area in a chamber is less than about 1 mL/cm².
- 20. (Currently Amended) The apparatus according to claim 19 wherein the ratio of interstitial volume to barrier surface area in a chamber is less than or equal to about 0.5 mL/cm².

21. (Currently Amended) The apparatus according to claim 20 wherein the ratio of interstitial volume to barrier surface area in a chamber is less than or equal to about 0.1 mL/cm².
22. (Currently Amended) The apparatus according to claim 21 wherein the ratio of sample volume to barrier surface area in a chamber is about 0.02 mL/cm².
23. The apparatus according to claim 15 wherein the first separation barrier is an electrophoresis membrane having a defined pore size and the second and third separation barriers are restriction membranes which allow flow of ions into and out of a chamber or compartment under the influence of an electric field.
24. The apparatus according to claim 23 wherein the separation membrane is an ion-permeable electrophoresis separation membranes comprised of polyacrylamide and having a molecule mass cut-off from about 1 kDa to about 1500 kDa.
25. The apparatus according to claim 24 wherein the restriction membrane is comprised of polyacrylamide and having a molecular mass cut-off less than the separation membrane.
26. (Currently Amended) The apparatus according to claim 15 wherein the first, second and third separation barriers are membranes ~~and such membranes~~ comprised of materials selected from the group consisting of ultrafiltration materials, electro dialysis materials, haemodialysis materials, and combinations thereof.
27. The apparatus according to claim 15 wherein the first, second and third separation barriers membranes are adapted to be removed from the apparatus.
28. (Currently Amended) An electrophoresis apparatus for processing compounds in small sample volumess ~~by electrophoretic separation, the apparatus~~ comprising:
- (a) a cathode in a static cathode buffer zone or compartment;
 - (b) an anode in a static anode buffer zone or compartment, the cathode disposed relative to the anode so as to be adapted to generate an electric field in an electric field area therebetween upon application of a voltage potential between the cathode and anode;
 - (c) a first non-isoelectric separation barrier disposed in the electric field area;
 - (d) a second non-isoelectric separation barrier disposed between a selected one of the cathode buffer zone and the anode buffer zone and the first barrier so as to define a first sample chamber having an interstitial volume of less than 5 mL therebetween;
 - (e) a third non-isoelectric separation barrier disposed between the anode buffer zone an the first barrier so as to define a first separation chamber having an interstitial volume of less than 5

mL therebetween; wherein in use, electrophoretic buffer is disposed in the cathode buffer zone and the anode buffer zone, and at least one of the first sample interstitial chamber and first separation interstitial volume chamber, a sample constituent containing one or more compounds is provided to the first interstitial volume sample chamber; wherein upon application of the voltage potential, a selected separation product compound is removed from the sample constituent through a selected the first and or second non-isoelectric separation barriers; and provided to the first separation interstitial volume chamber; and wherein there is substantially no circulation of buffer or sample constituent in the buffer zones or the first separation interstitial volume chamber.

29. (Currently Amended) The apparatus according to claim 28 wherein a least fourth separation barrier is disposed between the second separation barrier and the cathode buffer zone to define at least a second sample third chamber having an interstitial volume less than about 5 mL, wherein sample constituents are is provided to a selected second and third sample interstitial volume chamber, wherein upon application of the voltage potential, a selected separation product compound is removed from the sample constituents, through the separation barriers, and provided to the first separation interstitial volume chamber.

30. (Currently Amended) The apparatus according to claim 28 wherein at least a fifth separation barrier is disposed between the third separation barrier and the anode buffer zone to define at least a second separation fourth chamber having an interstitial volume of less than 5 mL, wherein the sample constituents are is provided to selected sample interstitial volume chambers, wherein upon application of the voltage potential, a selected separation product compound is removed from the sample constituents, through the separation barriers, and provided to a selected separation interstitial volume chamber.

31. (Currently Amended) The apparatus according to claim 30 wherein the apparatus further comprises at least a second cathode in a second static cathode buffer zone and a second anode in second static anode zone disposed relative to the second cathode so as to be adapted to generate an electric field between a selected sample interstitial volume chamber and another selected separation interstitial volume chamber.

32. (Currently Amended) The apparatus according to claim 15 wherein at least a fifth separation barrier is disposed between the third separation barrier and the anode buffer zone to define at least a second separation chamber having an interstitial volume of less than 5 mL,

wherein ~~a the sample constituent~~ is provided to the first ~~sample interstitial volume~~ chamber, wherein upon application of the voltage potential, a selected ~~separation product~~ compound is removed from the ~~sample constituent~~, through the separation barriers, and provided to selected ~~separation interstitial volume~~ chamber.

33. (Currently Amended) A method for de-salting or dialysing a small volume sample containing at least one compound and one or more salts, ~~the method~~ comprising:

- (a) providing an apparatus according to claim 1;
- (b) adding buffer to the cathode and anode buffer zones or compartments;
- (c) placing a sample in the first ~~interstitial volume~~ or chamber; and
- (d) applying a voltage potential, wherein upon application of the voltage potential, and one or more salts ~~selected salts~~ in the sample are removed from the ~~mixture sample~~ through a selected one of the first and second separation barriers and provided to a selected one of the cathode buffer zone and the anode buffer zone, wherein at least one compound is substantially retained in the first ~~interstitial volume~~ chamber, and wherein there is substantially no circulation of buffer or sample ~~constituent~~ in the buffer zones and the first ~~interstitial volume~~ chamber.

34. (Currently Amended) A method for de-salting or dialysing a small volume sample containing at least one compound and one or more salts, ~~the method~~ comprising:-

- (a) providing an apparatus according to claim 15;
- (b) adding buffer to the cathode and anode buffer zones or compartments and to at least one of the ~~interstitial volumes~~ or chambers;
- (c) placing a sample in a selected one of the first ~~interstitial~~ and second ~~interstitial volumes~~ or chambers; and
- (d) applying a voltage potential between the first ~~interstitial~~ and second ~~interstitial volumes~~ chambers, wherein upon application of the voltage potential, selected and one or more salts ~~salt~~ in the sample are removed from the mixture through a selected one of the first separation barrier and provided to the other of the first ~~interstitial~~ and second ~~interstitial volume~~ chamber, wherein at least one compound is substantially retained in first ~~interstitial volume~~ chamber from which the ~~selected salts were~~ is removed, wherein there is substantially no circulation of buffer or sample ~~constituent~~ in the buffer zones, the first ~~interstitial volume~~ chamber, and the second ~~interstitial volume~~ chamber.

35. (Currently Amended) A method of separating a compound in a small sample volumes of solution by electrophoretic separation, ~~the method comprising:~~

- (a) providing an apparatus according to claim 1;
- (b) adding buffer to the cathode and anode buffer zones or compartments;
- (c) placing a sample containing one or more compounds in the first ~~interstitial volume or~~ chamber; and
- (d) applying a voltage potential, wherein upon application of the voltage potential, ~~selected separation products~~ a compound in the sample ~~are~~ is removed from the ~~mixture sample~~ through a selected one of the first and second separation barriers and provided to a selected one of the cathode buffer zone and the anode buffer zone, wherein at least one compound is substantially retained in the first ~~interstitial volume~~ chamber, and wherein there is substantially no circulation of buffer or sample ~~constituent~~ in the buffer zones and the first ~~interstitial volume~~ chamber.

36. (Currently Amended) A method of separating a compound in small sample volumes of solution by electrophoretic separation, ~~the method comprising:~~

- (a) providing an apparatus according to claim 15;
- (b) adding buffer to the cathode and anode buffer zones or compartments and to at least one of the ~~interstitial volumes or chambers~~;
- (c) placing a sample containing a mixture of two or more compounds in a selected one of the first ~~interstitial and second interstitial volumes or chambers~~; and
- (d) applying a voltage potential between the first ~~interstitial and second interstitial volumes~~ chambers, wherein upon application of the voltage potential, ~~selected separation products~~ a first compound in the sample ~~are~~ is removed from the mixture through a selected one of the first separation barrier and provided to the other of the first ~~interstitial and second interstitial volume~~ chamber, wherein ~~at least one~~ a second compound is substantially retained in first ~~interstitial volume~~ chamber from which the ~~selected separation products~~ first compound ~~was~~ were removed, wherein there is substantially no circulation of buffer or sample ~~constituent~~ in the buffer zones, the first ~~interstitial volume~~ chamber, and the second ~~interstitial volume~~ chamber.